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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/711,908 11/15/00 KOIDE

N PM268415

000909
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MM91/1107

EXAMINER

LOUIE, W

ART UNIT

PAPER NUMBER

2814

DATE MAILED:

11/07/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/711,908

Applicant(s)

KOIDE ET AL.

Examiner

Wai-Sing Louie

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 21-32 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 21-32 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 21-32 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 21-32 are method claims, however, there is no process limitations.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 21-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shibata et al. (US 6,008,539) in view of Shakuda (US 5,557,115) and Shibata et al. (US 6,191,436).

With regard to claims 21-24, Shibata et al. (539) disclose a method of manufacturing a light-emitting device, LED (539 col. 3, line 60 to col. 6, line 5 and fig. 1) comprising forming a light-emitting layer comprised of $\text{In}_x\text{Al}_y\text{Ga}_{1-x-y}\text{N}$ over a sapphire substrate (539 col. 3, line 64), but does not disclose the $\text{In}_x\text{Al}_y\text{Ga}_{1-x-y}\text{N}$ light-emitting layer having an indium mole fraction and emits light wavelength λ (nm) = $1239.8/E_g$ (eV), $E_g \leq 3.4*(1-x) + 1.95*x - 1.0*x*(1-x)$.

However, Shakuda discloses the indium mole fraction is set 0.15 (Shakuda col. 4, line 12) and

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the light-emitting layer emits light have a peak wavelength of 470 nm, which is blue light (Shakuda col. 4, lines 19-21). Shakuda teaches to regulate the mixture ratio of In to Ga in the light emitting layer can change the wavelength of light generated (Shakuda col. 4, lines 27-29). Therefore, it would have been obvious to one with ordinary skill in the art to regulate the mole fraction of Indium in order to control the desired light emission. In addition, it is known in the art that a ternary compound having a band gap can be given as quadratic in the molar fraction. It would have been obvious to perform experimentation to determine the band gap as a function of molar fraction.

With regard to claims 25 and 26, Shibata et al. (539) modified by Shakuda do not disclose another range of indium mole fraction of 0.19 to about 0.26, which emits green light having a peak wavelength ranging from 510 to 530 nm. However, Shakuda teaches that the mixture ratio of Indium to Gallium in the light-emitting layer increases, the wavelength of the light generated at this layer also increases (Shakuda col. 4, lines 27-29). The LED can be made to emit light of different color such as green (Shakuda col. 6, lines 59-61). Therefore, it is obvious that LED could emit green light, which has a wavelength about 520 nm, if Shakuda changes the indium mole fraction such as 0.19-0.26.

With regard to claim 27, Shibata et al. (539) disclose the method of manufacturing the LED comprising:

- Disposing a buffer layer 2 comprising AlN on the sapphire substrate;
- Interposing a first clad layer 3 comprising n-GaN between the buffer layer and the light-emitting layer;

- Forming a second clad layer 7 comprising p-GaN doped with magnesium over the light-emitting layer.

With regard to claim 28, Shibata et al. (539) disclose depositing a p-side electrode comprising gold on the second clad layer and depositing an n-side electrode pad on the first clad layer, but does not disclose the p-side electrode is transparent. However, Shibata et al. (436) disclose the gold electrode is transparent (436 col. 3, line 11). Shibata et al. (436) teach the transparent gold electrode layer absorbs heat from the p-side electrode pad and do not conduct heat to the semiconductor layers below (436 col. 3, lines 50-50). Shibata et al. also disclose light emitted from the device can transmit through the transparent electrode layer (436 col. 3, lines 18-27). Thus, it would have been obvious at the time the invention was made to have a transparent electrode layer in order to transmit light and to dissipate heat.

With regard to claims 29 to 31, Shibata et al. (539) disclose interposing a layer 6 comprising Mg doped AlGa_N (539 col. 4, line 5), which has a formula of In_xAl_yGa_{1-x-y}N (539 col. 3, line 64). Layer 6 is interposed between the light-emitting layer and the second clad layer 7. The acceptor is magnesium, which is a group IIA element.

With regard to claim 32, Shibata et al. (539) disclose the layers are grown as crystals by a metal organic vapor phase epitaxial (MOVPE) growth method (539 col. 4, lines 20-21) with nitrogen (539 col. 5, line 9), but do not disclose ammonia and alkyl compound gases containing a group III element. However, Shibata et al. (539) disclose the semiconductor layer is formed by MOVPE method and the layers contain In, Ga and Al, which is group III elements. Ammonia and alkyl compound gases are common chemicals used in MOVPE process. Hence, it would have been obvious to one with ordinary skill in the art to use ammonia and alkyl compound

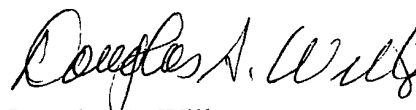
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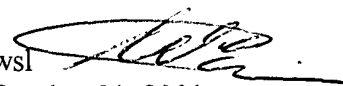
gases containing a group III element in Shibata's device in order to build the semiconductor layers.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wai-Sing Louie whose telephone number is (703) 305-0474. The examiner can normally be reached on 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (703) 306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.


Douglas A. Wille
Patent Examiner


wsl
October 31, 2001